Movement of Abiu fruit, *Pouteria caimito*, from Hawaii into other regions of the United States of America

Qualitative, Pathway-Initiated Pest Risk Assessment

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A. Introduction

This pest risk assessment was prepared by the Animal and Plant Health Inspection Service (APHIS) of the U.S. Department of Agriculture (USDA) to examine plant pest risks associated with the movement into other parts of the United States of **fresh abiu fruit (*Pouteria caimito*) grown in Hawaii**. This is a qualitative pest risk assessment, that is, estimates of risk are expressed in qualitative terms such as high or low as opposed to numerical terms such as probabilities or frequencies.

International plant protection organizations (*e.g.*, North American Plant Protection Organization (NAPPO), International Plant Protection Convention (IPPC) of the United Nations Food and Agriculture Organization (FAO)) provide guidance for conducting pest risk analyses. The methods used to initiate, conduct, and report this plant pest risk assessment are consistent with guidelines provided by NAPPO, IPPC and FAO. The biological and phytosanitary terms (*e.g.*, introduction, quarantine pest) used in this document conforms with the *NAPPO Compendium of Phytosanitary Terms* (NAPPO 1995) and the *Definitions and Abbreviations* (Introduction Section) in *International Standards for Phytosanitary Measures, Section 1—Import Regulations: Guidelines for Pest Risk Analysis* (FAO 1995).

Pest risk assessment is one component of an overall pest risk analysis. The *Guidelines for Pest Risk Analysis* provided by FAO (1995) describe three stages in pest risk analysis. This document satisfies the requirements of FAO Stages 1 (initiation) and 2 (risk assessment).

The Food and Agriculture Organization (FAO, 1995) defines "pest risk assessment" as "Determination of whether a pest is a quarantine pest and evaluation of its introduction potential". "Quarantine pest" is defined as "A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled" (FAO, 1995; NAPPO, 1995). Thus, pest risk assessments should consider both the likelihood and consequences of introduction of quarantine pests. Both issues are addressed in this qualitative pest risk assessment.

This document presents the findings of the qualitative plant pest risk assessment. The assessment methods or the criteria used to rate the various risk elements are not described in detail. The details of the methodology and rating criteria can be found in the "template" document: ***Pathway-Initiated Pest Risk Assessment: Guidelines for Qualitative Assessments, version 4.0*** (USDA, 1995); to obtain a copy of the template, contact the individual named in the proposed regulations.

B. Risk Assessment

1. Initiating Event: Proposed Action

This pest risk assessment is commodity-based, and therefore "pathway-initiated"; the assessment in response to the request for USDA authorization to allow movement of a particular commodity presenting a potential plant pest risk. In this case, the movement of **fresh abiu fruits grown in Hawaii** into other parts of the U.S. is a potential pathway for introduction of plant pests. Regulatory authority for the movement of fruits and vegetables from Hawaii into other parts of the U.S. is found in 7 CFR §318.13.

Pouteria caimito (Ruiz Lopez & Pavon) Radlk. is in the plant family Sapotaceae which includes about 30 genera and 400 species of shrubs and small trees mainly in tropical and subtropical regions (Neal, 1965). ***Pouteria caimito*** is grown in South America, especially Brazil, Peru, and Colombia

for its fruits (Uphof, 1968). Its natural range is Costa Rica, Colombia, Venezuela, Suriname, French Guiana, Ecuador, Peru, Bolivia and Brazil (Amazonian and coastal regions).
Synonyms for the species are *Achras caimito* Ruiz Lopez & Pavon and *Lucuma caimito* (Ruiz Lopez & Pavon) Roemer & Shultes (USDA, 1996a).

2. Assessment of Weediness Potential of Abiu, *Pouteria caimito*

Table 1 shows the results of the weediness screening for ***Pouteria caimito***. These findings did not require a pest-initiated risk assessment.

Table 1: Process for Determining Weediness Potential of Commodity

Commodity: *Pouteria caimito* (Ruiz Lopez & Pavon) Radlk.
Common name: Abiu

Phase 1: *Pouteria caimito* is not widely prevalent in the United States.
It can be cultivated outdoors in Florida and elsewhere in greenhouses. Other species of *Pouteria* grow in Puerto Rico.

Phase 2: Is the species listed in:

NO	*Geographical Atlas of World Weeds* (Holm, 1979)
NO	*World's Worst Weeds* (Holm, 1977)
NO	*Report of the Technical Committee to Evaluate Noxious Weeds; Exotic Weeds for Federal Noxious Weed Act* (Gunn & Ritchie, 1982)
NO	*Economically Important Foreign Weeds* (Reed, 1977)
NO	Weed Science Society of America list (WSSA, 1989)
NO	Is there any literature reference indicating weediness (*e.g.*, *AGRICOLA*, *CAB*, *Biological Abstracts*, *AGRIS*; search on "species name" combined with "weed").

Phase 3: Conclusion:

This commodity does not pose a significant risk as a weed and we proceeded with this pest risk assessment according to our guidelines (USDA, 1995).

3. Previous Risk Assessments, Current Status and Pest Interceptions

3a. Decision history for *Pouteria caimito*:

There are no previous risk assessments (decision sheets) on *Pouteria caimito* from Hawaii.

3b. Interceptions from Hawaii FY 1985-95 into Continental USA (includes BATS 309 Database and PINET.

PEST	HOST	TOTAL
Tephritidae, species of	*Pouteria campechiana*	1

4. Pest List: Pests Associated with Abiu in Hawaii

Table 2 shows the pest list for *Pouteria* spp. which was developed after a review of the information sources listed in USDA (1995). The pest list summarizes information on the distribution of each pest, pest-commodity association, and regulatory history.

Table 2: Pest List - *Pouteria* spp.

Scientific Name, Classification	Distribution[1]	Comments[2]	References
Algae			
Cephaleuros virescens Kunze Algae leaf spot	HI,US	a,c,m	Wellman, 1977; Raabe *et. al.*, 1989
Pathogens			
Colletotrichum gloeosporioides (Penz.) Penz. & Sacc. in Penz. Fruit spot	HI,US	c,m,o,z_e	Raabe *et. al.*, 1981; Farr *et. al.*, 1989
Cylindrocladium pteridis F. A. Wolf (Fungi Imperfecti: Hyphomycetes)	HI,FL	a	Raabe *et. al.*, 1981; Farr *et. al.*, 1989
Lasiodiplodia theobromae (Pat.) Griff. & Maubl. (Fungi Imperfecti: Coelomycetes) Dieback	HI,US	a,c,m,o	Raabe *et. al.*, 1981; Farr *et. al.*, 1989
Arthropods			
Aphis gossypii Glover (Homoptera: Aphididae)	HI,US	a,c,m,o,y	Blackman & Eastop, 1994; CIE, 1968
Bactrocera dorsalis Hendel (Diptera: Tephritidae)	HI,US_3	h,z_i	White, 1992
Ceratitis capitata Wiedemann) (Diptera: Tephritidae)	HI,US_3	h,z_i	White, 1992
Ceroplastes rubens Maskell (Homoptera: Coccidae)	HI,GU,FL	a,n,z_e	Lim & Ramsay, 1992; Kunishi & Kitagawa, 1996

Coccus viridis (Green) (Homoptera: Coccidae)	HI,FL,(DC,NY in greenhouses)	h,n,x,z_e	USDA, 1996
Toxoptera aurantii (Boy.) (Homoptera: Aphididae)	HI,US	a,c,o,y	Blackman & Eastop, 1994; CIE, 1961

[1] Distribution legend: HI = Hawaii; US = other parts of the United States; DC = District of Columbia; GU = Guam; FL = Florida; NY = New York

[2] Comments:
- a = Pest mainly associated with a plant part other than the commodity.
- c = Listed in non-reportable dictionary as non-actionable.
- f = Pest occurs in the U.S. and is not subject to official restrictions and regulations.
- h = Quarantine pest: pest has limited distribution in the U.S. and is under official control.
- m = The pest occurs within the PRA area and has been reported to attack the genus in other geographic regions; but has not been reported to attack the specific host species in the PRA area.
- n = Listed in the USDA catalogue of intercepted pests as actionable.
- o = Pest does not meet the geographic or regulatory definition of a quarantine pest
- x = Multiple interceptions on this host.
- y = Pest is a vector of plant pathogens.
- z_e = External pest: is known to attack or infest fruits of *Pouteria* spp. and it would be reasonable to expect the pest may remain with the commodity during processing and shipping.
- z_i = Internal pest: is known to attack or infest fruits of *Pouteria* spp. and it would be reasonable to expect the pest may remain with the commodity during processing and shipping.

3 *Bactrocera dorsalis* and *Ceratitis capitata* has been detected on occasion in the United States. Whenever they are detected, a quarantine is established and an eradication program implemented. This fruit fly is considered to be a quarantine pest in the United States.

5. List of Quarantine Pests

The list of quarantine pests for commercial shipments of abiu fruits from Hawaii is provided in Table 3. Should any of these pests be intercepted on commercial (or any other) shipments of abiu, quarantine action may be taken.

Table 3: Quarantine Pests: Abiu fruits consumption

Pathogens	**None**
Arthropods	***Bactrocera dorsalis***
	Ceratitis capitata
	Ceroplastes rubens
	Coccus viridis

6. Quarantine Pests Likely to Follow Pathway (*i.e.*, Quarantine Pests Selected for Further Analysis)

Only those quarantine pests that can reasonably be expected to follow the pathway, *i.e.*, be included in commercial shipments of abiu fruits, were analyzed in detail (see USDA, 1995 for selection criteria). Only quarantine pests listed in Table 4 were selected for further analysis and subjected to steps 7-9 below.

Table 4: Quarantine Pest Selected for Further Analysis: Hawaiian abiu fruits for consumption

Pathogens	**None**
Arthropods	***Bactrocera dorsalis***
	Ceratitis capitata
	Ceroplastes rubens
	Coccus viridis

7. Economic Importance: Consequences of Introduction

The consequences of introduction was considered for each quarantine pest selected for further analysis. For qualitative, pathway-initiated pest risk assessments, these risks are estimated by rating each pest with respect to five risk elements. A full description of these elements and rating criteria can be found in USDA (1995). Table 5 shows the risk ratings for these risk elements.

Table 5: Risk Rating: Consequences of Introduction

Pest	Climate/ Host	Host Range	Dispersal	Economic	Environ-mental	Risk Rating
Bactrocera dorsalis	high	high	high	high	high	high
Ceratitis capitata	high	high	high	high	high	high
Ceroplastes rubens	high	high	low	medium	medium	medium
Coccus viridis	high	high	low	medium	medium	medium

8. Likelihood of Introduction

Each pest is rated with respect to introduction potential (*i.e.* entry and establishment). Two separate components were considered. First, the amount of commodity likely to be moved is estimated. More movement leads to greater risk; the result is a risk rating (0, 1, or 2) that applies to the commodity and country in question and is the same for all quarantine pests considered. Second, five biological features *i.e.,* risk elements, concerning the pest and its interactions with the commodity are considered. The resulting risk ratings were specific to each pest. Details of elements and rating criteria can be found in USDA (1995). The cumulative risk for introduction was considered to be an indicator of the likelihood that a particular pest would be introduced. Table 6 shows the ratings for these risk elements.

Table 6: Risk Rating: Likelihood of Introduction

Pest	Quantity of commodity imported annually	Likelihood survive postharvest treatment	Likelihood survive shipment	Likelihood not detect at port of entry	Likelihood moved to suitable habitat	Likeli-hood find suit-able host	Risk rating
Bactrocera dorsalis	low	high	high	high	high	high	high
Ceratitis capitata	low	high	high	high	high	high	high
Ceroplastes rubens	low	high	high	medium	low	high	medium
Coccus viridis	low	high	high	medium	low	high	medium

9. Conclusion: Pest Risk Potential and Phytosanitary Measures

The measure of pest risk potential combines the risk ratings for consequences and likelihood of introduction as described in USDA (1995). Table 7 shows the estimated pest risk potential for the quarantine pests selected for further analysis for the movement of *Pouteria caimito* from Hawaii.

Table 7: Pest Risk Potential, Quarantine Pests, *Pouteria caimito* from Hawaii

Pest	Pest risk potential
Bactrocera dorsalis	high
Ceratitis capitata	high
Ceroplastes rubens	medium
Coccus viridis	medium

For pests receiving a high PRP risk rating (*i.e., Bactrocera dorsalis* and *Ceratitis capitata*), we recommend specific phytosanitary measures be implemented, port-of-entry inspection is not considered sufficient to provide phytosanitary security. PPQ currently inspects other commodities from other areas which serve as hosts for *Ceroplastes rubens* and *Coccus viridis*. The pest risk management

phase of the PRA is not part of this document. Appropriate sanitary and phytosanitary measures to mitigate pest risk will be determined during the pest risk management phase.

PPQ has intercepted almost 500 pests on fruits of *Pouteria* spp. from other areas of the world, however, virtually all external pests listed could be detected by inspection. Some of these same pests occur in Hawaii in addition to other quarantine pests and have been intercepted as hitchhikers with other commodities. Should any of these pests be intercepted on commercial (or any other) shipments of abiu, quarantine action may be taken.

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